

M. Furuholm. The second will prove of considerable importance for Eskimaux philology. The most noticeable fact connected with Sitka grammar is that "there are only two cases, nominative and instrumental," and that the instrumental case of the pronouns is employed with active verbs, which means that no true verb exists in the language.

The second half of the volume is occupied by an exhaustive account of the tribes of Western Washington and North-Western Oregon, by Mr. George Gibbs. While the ethnology of these tribes has been treated minutely, their dialects have received the attention to be expected from so able a philologist, and lengthy tables of comparative vocabularies are followed by a complete Niskwalli-English and English-Niskwalli dictionary. Mr. Gibbs begins by saying that "in the western district of Washington Territory—that is to say, between the Cascade Mountains and the Pacific—there is found, compared with the extent of country occupied, an extraordinary diversity in the aboriginal tongues. Mr. Hale, the ethnologist, who accompanied Capt. Wilkes's expedition, recognised among them eight languages belonging to five distinct families, and to these are now to be added six other languages which escaped his observation. In addition there are several but partially intelligible, even to those speaking the same general language." It is the old story; the lower we descend the larger becomes the number of dialects and independent tongues which it is the part of civilisation to destroy and unify. The further back we trace the stream of human speech the greater is its diversity, the more manifold its forms.

Among the ethnological facts brought to light by Mr. Gibbs, may be mentioned the universal flattening of the skull, the use of the haikwa shell as a medium of exchange, and of armour composed of elk-skins or of thin pieces of hard wood. Scalping is unknown, as are also totemism and the division of the tribe into clans, while, on the other hand, "slavery is thoroughly interwoven with the social polity of the Indians of the coast." Earth-works are found in various parts of the district, though they never present the figures of animals, and the existing Indians have no traditions of their origin. But there are clear evidences that the present population of the country is a mixed one, and was probably preceded by a more civilised race. Thus the Makah differ from the Indians of the Sound "in features and habits as much as language." In fact, the Indians of North America differ among themselves, both physiologically and linguistically, no less than the natives of Europe, and to lump them together under a single name is as rude and unscientific a proceeding as that of the Greeks and Romans, with whom all other peoples were "barbarians." If the labours of Mr. Powell and his assistants do nothing more than impress this fact on the student of language and race, they will have effected a good and needful work.

A. H. SAYCE

CULLEY'S PRACTICAL TELEGRAPHY

A Handbook of Practical Telegraphy. By R. S. Culley. Seventh Edition. (Longmans, 1878.)

THIS well-known book has reached its seventh edition. It was first published in the year 1863, and 190 pages were sufficient to recount its practical instructions.

Now 450 pages scarcely suffice to accomplish its purpose. The book reminds one of some old house that has been added to from time to time by different occupiers until it has lost all trace of plan or design. Valuable teachings of experience on one subject are found buried here and there in chapters devoted to other subjects. It is a pity that the author did not thoroughly revise and rewrite his book. It is more like some old housewife's recipe book, full of useful and valuable information, scattered indiscriminately about, than a methodical scientific manual of a grand practical art which has grown within the last few years with gigantic strides. It never pretended to be the result of scientific originality or profound research, but simply to be a practical book intended for practical men. Its great success is more a proof of its want than of its merit. Nevertheless it has merit, and that of no mean order.

Commencing with the sources of electricity and the laws of the current, of magnetism and electromagnetism, of induction and of atmospheric and cosmic electricity, it proceeds to describe the construction of a line of telegraph, both over-ground and under-ground. Modes of testing the various apparatus used, and the systems for signalling are fully described. Cable working and testing receive very exhaustive treatment. The automatic system of working—the child of Bain and the pupil of Wheatstone—receive full handling, and the recent developments of the duplex and quadruplex systems receive their fair share of description. The telephone is not neglected, but we must wait for an eighth edition for the later wonderful developments of Hughes and Edison.

In speaking of the history of the telegraphic system in this country in his meagre but pithy introduction, Mr. Culley says:—"No assistance whatever was granted by the Government, and it was only after several years of adversity that the undertaking became firmly established." Rather a strange remark from the pen of an officer of a company who owed its foundation to the support of the Government. The first contract of any magnitude ever made by the founders of the company was with the Government, who agreed to pay 1,500*l.* a year for twenty years, and 1,000*l.* a year for another twenty years, for telegraphic communication to Portsmouth; and it was this contract that enabled them to float their concern. However, it is an Englishman's happy privilege to abuse to his heart's content his own Government for what it does not do, and to ignore entirely what it does do, and we should be sorry to interfere with his prerogative in this respect; but it is curious to find a Government official making such a sweeping and erroneous statement as the above in a book accepted by his department as its text-book.

It is in the development of submarine telegraphy that England principally shines on the Continent and in America, and it is surprising to find our author omitting all mention of her great deeds in this field. English enterprise in this respect is most marked. English capital is invested in every sea, and English genius has surmounted every difficulty, whether natural, mechanical, or electrical. In 1876 the length of cable laid was 63,990 nautical miles, of which 59,547 were owned by private companies.

There is a great tendency to deny the existence

of English inventive genius. The over-shadowing influence of the recent sensational inventions of the telephone and phonograph have led even practical men to believe that inventive power had crossed the Atlantic, but no one who reads Mr. Culley's book can fail to learn how much has been done in England. Though duplex working was revived by Hearns, and quadruplex made practical by Edison, neither was invented in America. On the other hand, Hughes's beautiful type-printer was born in America, but it was developed in Europe, and its birthplace knows it not. Thomson's syphon recorder, Varley's double-current translator and condenser working, Bain and Wheatstone's automatic systems, fast-speed translators, and all the valuable systems and apparatus in use for testing have sprung from here, and are well described in this work. The Post Office telegraph system, in its technical department, is a credit to this country and a pattern to the world, and it possesses on its staff some of the most practical electricians of the day. Messrs. Preece, Lumsden, Marson, Gavey, and Kempe are well known everywhere, and though their labours are not acknowledged by Mr. Culley, it is well known that they have contributed materially to establishing the telegraphic system of the Post Office. It is especially in developing the automatic system and in establishing fast-speed translators that the Post Office officials have been so successful. A relay station in Anglesey has increased the rate of working [between London and Dublin from 70 to 120 words per minute. Translating relays working at the rate of 120 words per minute are quite new in telegraphy. Mr. Culley has given scant justice to Mr. John Fuller for his new form of bichromate battery, a battery that is coming into very extensive employment for all purposes. It is a zinc-carbon couple, the exciting fluid being Poggendorff's mixture. Its peculiarity consists in the shape of the zinc, which is permanently inserted in a bath of mercury. Its electromotive force is double that of a Daniell's cell, its constancy wonderful, its economy great, and its cleanliness and freedom from smell all that can be desired.

This work is deservedly popular, not from its literary merit, but from the position of the author and from the great mass of very valuable practical information it possesses.

OUR BOOK SHELF

Manual of the Vertebrates of the Northern United States, Including the District East of the Mississippi River and North of North Carolina and Tennessee, Exclusive of Marine Species. By Prof. D. S. Jordan, M.D. Second edition, Revised and Enlarged. (Chicago: M^cClurg, 1878.)

THE object of this volume is to give collectors and students a ready means of identifying the families, genera, and species of the vertebrate animals of North America. Following the usage of botanists, the author has adopted the system of artificial keys to the classes, orders, families, genera, and species, while use has been freely made of every available source of information. The account of the mammals has been chiefly compiled from Prof. Baird's work, and Dr. Coues has given great assistance in the part relating to the birds; while in this edition the account of the fishes has been entirely re-

written in order to include the results of recent investigations in that department. The fact that a work of this nature should in two years' time call for a second edition, is, indeed, a proof of the interest taken in natural science by the American people. This edition seems to fairly represent the present state of knowledge.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

The Phonograph and Vowel Theories

SEVERAL letters have appeared in NATURE bearing on the subject of the phonograph, and referring to our first communications upon the subject. We are glad to see that our statement as to the reversibility of consonants (NATURE, vol. xvii. p. 423) is generally accepted. We feel that as yet the phonograph does not speak with sufficient clearness to determine how perfect this reversibility is, and that the effect of many minute parts of articulate utterance cannot be heard with any certainty. Mr. Ellis, in his first communication, ranked the phonograph somewhat too low, but we are more than satisfied with the acknowledgment in his second letter (vol. xviii. p. 38). Mr. A. M. Mayer and Prof. Sylvanus Thompson both speak of the marks on the tinfoil as differing according to the distance of the mouth from the diaphragm. We do not observe any effect of this kind and see no theoretical reason for any alteration in the relative phases of the simple tones with a change of distance from the mouth. Mr. Mayer seems here to have fallen into an error. We find ample confirmation of Helmholtz's statement that the phase relation between two constituents is not appreciated by the ear. Each person usually, but not invariably, adheres to the same phase relation on one pitch, but different people pronouncing the same vowel with approximately the same constituents, combine these differently, which, as Mr. Mayer says, would make reading the marks on the tinfoil a very difficult matter.

With reference to the letter by Mr. C. R. Cross which appears in NATURE, vol. xviii. p. 93, we adhere with much confidence to the opinion that the five vowels, *a e i o u* (Italian), pronounced in succession, are by contrast at least thoroughly distinguishable when the instrument is run at various speeds, such as to reproduce the sounds at all the pitches within the compass of the average human voice. That no marked change is produced in the relative values of the vowels is confirmed by the fact that neither in public nor private exhibitions do the hearers of sentences alternately run slow and fast suggest that the vowels have changed with a change of speed. This alone would be a sufficient proof that *oh* does not change into *æ*, as we understand Mr. Cross to say, and there is no ground, according to Helmholtz's theory, for expecting that it would. To us the relative sounds of the vowels at various speeds seem at least as perfect as those obtained from Willis's well-known experiment, where a succession of vowels is suggested by contrast when the length of a resonating tube is altered.

We do not, however, think that our instrument speaks with sufficient distinctness to warrant our expressing an opinion as to the constancy of quality of any single vowel when the instrument is run at various speeds.

Some *ohs* remain apparently very constant, and at times we thought that other *ohs* became brighter or more like "awe."

Sometimes we thought *awe* became very like "ah." We should be glad to learn the impressions of any of your readers as to this point.

We venture, however, to remind any one trying the experiment that a low note followed by a high one suggests a change from *u* (Italian) to *i*. Thus if we whistle a low note and then the octave to it or a note near this, the ear is easily persuaded that the whistle resembles *ui*, but if now, beginning again on the note we just thought was *i*, we go up another octave, the new sequence again suggests *ui*, although the very note which was last taken to represent *i* now stands for *u*. If, therefore, we wish to judge what a sound really is we should not trust much to contrast, especially when a change of pitch is involved in the comparison.